REMARKS

Claims 1 and 4-13 are pending in the present application, claims 2 and 3 having been cancelled and claim 13 having been added. The Office Action and cited references have been considered. Favorable reconsideration is respectfully requested.

Rejection under 35 U.S.C. § 112, First Paragraph

Claims 1-12 were rejected under 35 U.S.C. § 112, first paragraph as allegedly failing to comply with the written description requirement. The Office contends that the specification lacks written description of how to symbolically modify the ATM network in the normalizing step, how to construct a link cost equation and how the members are taken with respective relative importance weights, as claimed in the step of constructing a link cost equation of claim 1. This rejection is respectfully traversed.

The proposed method relates to optimization and telecommunication networks and, as described, can be understood by those of ordinary skill in the art of ATM telecommunication networks and in the problems related to selecting a path satisfying criteria of Quality of Service (QoS) in such networks. The method is described in the application as originally filed by describing a sequence of

steps, which steps, if reduced to practice, would need to be programmed into a computer by those of ordinary skill in the art of software engineering. However, such programming could be accomplished without undue experimentation by one of ordinary skill in the art. Applicant respectfully submits that at least the originally filed claims, including but not limited to claim 11, and the summary of the invention (pages 5-8) comprise a verbal description of a specific detailed flow chart of the proposed method. This verbal flow chart can be understood by one of ordinary skill in the art with the aid of the originally presented figures and explanations of these figures.

The feature of "normalizing the D-parameter CDV by symbolically modifying the ATM network" in claim 1 has been amended to introduce the features of previously filed claim 2. The amendment is supported by the description, particularly Fig. 1 and its corresponding description, original claims 2 and 11, and the corresponding portions of the summary. The feature "constructing a link cost equation..." in claim 1 has been amended by introducing the features of claim 3. The amendment is supported by the original description, the text portion from page 2, line 19 to page 13, line 18, and particularly the description of Fig. 2, which begins on page 12, line 19.

Applicant has also amended claim 1 to use the term "virtually modifying the ATM network" in place of "symbolically modifying..." This amendment has been made in an effort to clarify the claimed invention. Applicant respectfully submits that as originally claimed, and as amended, the recitation is fully supported by the application as originally filed.

For at least these reasons, Applicant respectfully submits that claims 1-13 are fully supported by the written description of the application as originally filed. Withdrawal of the rejection is respectfully requested.

Rejection Under 35 U.S.C. § 112, Second Paragraph

Claims 1 and 11 were rejected under 35 U.S.C. § 112, second paragraph due to a number of informalities. These informalities have been corrected. Withdrawal of this rejection is respectfully requested.

Rejection Under 35 U.S.C. § 102

Claims 1-12 were rejected under 35 U.S.C. § 102(e) as being unpatentable over Kataria et al. (U.S. Patent No. 6,687,229). This rejection is respectfully traversed for the following reasons.

Claim 1 recites a method for selecting an optimal path in an ATM network having a plurality of links where, for

each of the links, Link State Parameters are defined including a group of non-D parameters comprising at least AW, and two D-parameters being MaxCTD and CDV. According to the claimed method, two limitations of end-to end QoS parameters of a path to be selected between a source point and a destination point in the network are obtained, one of the limitations being $MaxCTD_{QoS}$ and the other limitation being CDV_{QoS}. A D-parameter CDV is normalized by virtually modifying the ATM network so as to make CDV constant for all links of the modified network, by selecting a value of minCDV such, that values of CDV parameter of the network links are substantially represented as respective k-fold multiples of the minCDV, where k is integer, building a modified network by symbolically replacing each of the links, having CDV value of k*minCDV where k>1, with "k" fictitious component links each having the CDV value equal to said minCDV so, that the CDV value of each replaced link be equal to a cumulative value of corresponding CDV values of the "k" fictitious component links, and assigning to the "k" fictitious links values of remaining Link State Parameters in a manner providing equivalence of the "k" links to the replaced link from the point of each of the link state parameters. A link cost equation comprising a first member reflecting influence of a D-parameter MaxCTD on the cost, and a second member reflecting influence of the group of non-D

parameters on the cost, the members being taken with respective relative importance weights. A relative importance weight of the member associated with the D-parameter is defined as R, and a relative importance weight of the member associated with the non-D parameters is defined as (1-R). Based on the link cost equation, links' costs of the modified network are calculated, for one or more values of a ratio between the relative importance weight of the first member and that of the second member, and a database is formed of link costs for each of the one or more ratio values. A Bellman-Ford-type shortest path algorithm is applied to each of the formed databases to determine one or more conditional paths for the respective one or more databases. The algorithm is capable of selecting a minimal cost path among paths limited by a given number of links to satisfy the limitation CDV_{Qos}. One or more cumulative values $MaxCTD_{cum}$ of the D-parameter MaxCTD are calculated for said respective one or more determined conditional paths. A judgment is made about the optimal path, based on comparing the one or more cumulative values $MaxCTD_{cum}$ with the limitation $MaxCTD_{Qos}$. The optimal path is of said one or more determined conditional paths, satisfying both the limitation CDV_{Qos} and the limitation $MaxCTD_{Qos}$. This is not taught, disclosed or made obvious by the prior art of record.

Examiner's Objections To Claim 1

Applicant respectfully submits that although, among other things, the cited patent to Kataria describes a solution for a path selection algorithm, Kataria uses a different set of parameters, processes the set of parameters in a way different from the Applicant's method, and the resulting algorithm of the path selection is much slower than the algorithm presented in the present application. In the Office Action, the Examiner sets forth his assertions as to where in the Kataria patent the claim limitations may be found. Applicant respectfully disagrees.

The Examiner contends that Kataria uses the same set of parameters for his algorithm. The present invention claims a method for selecting an optimal path by using two limitations of the end-to-end QoS (Quality of Service) parameters: CDV and MaxCTD.

For his algorithm, Kataria takes into account ONLY the CDV parameter limitation. Kataria mentions the MaxCTD requirement (among many others) only nominally, in formulation of a general purpose (col. 2, line 12.) Likewise, the text in col. 4, line 54 - col. 5, line 17 mentions that "the question of whether MaxCTD...... should be included in the shortest path determination path has not been addressed."

Kataria's algorithms use only a CDV QoS requirement, and this fact can be seen in the Figs. 2, 3, 5, 6, 7, 8, 9, 10; and in the text in col. 5 - col. 16. (Note, that in the Kataria's Figs. 3, 6, 8, 10, instead of the phrase "CELL DISPLAY VARIATION," one should read "CELL DELAY VARIATION".) Moreover, Kataria explicitly defines his invention in the Summary as "A method... for shortest path selection based on a SINGLE delay metric..." (col.3, lines 45-48.)

The present application indeed and simultaneously takes into account two QoS delay metrics (CDV and MaxCTD [as Delay parameters or D-parameters] and at least one non-D-parameter AW (Administrative Weights). From the practical point of view, satisfying two QoS parameters (and not a single parameter) in the selected Path is extremely important. In practice, there may be many situations that the path selected to satisfy only one QoS parameter - say, the CDV requirement, will not satisfy the MaxCTD requirement (*e.g.* if some links are long-distance fast and some links are short-distance low). In the path selection method according to the invention, Applicant takes into account both the CDV and the MaxCTD requirements and shows the effective way to do it.

The Examiner contends that Kataria teaches the following feature of Applicant's claim 1: "normalizing the D-parameter CDV by virtually (symbolically) modifying the ATM network so as to make the CDV parameter constant for all links of the modified network." The text portion (col. 5, lines 25-47 of Kataria), cited by the Examiner to support his opinion, has nothing in common with the above-quoted feature. The cited section relates to the delay metrics that could be used to implement the Kataria invention.

In contrast, the specification of the present invention comprises full support of the above feature. See for example, claim 11, which specifies steps of Claim 1, Fig. 1 and the suitable description to Fig. 11 (page 11, line 26 - page 12, line 19). In Fig. 1, a real link "link j" is shown as consisting of a number (k) of virtual (fictitious) links. The value of parameter CDV(j) of the real "link j" is divided into "k" values "minCDV", and each of the "k" fictitious links has the "normalized" (minimal possible) value of CDV, namely the value "minCDV". In this way, the parameter CDV is "normalized" by making it constant for each link of the modified network. There is no disclosure in Kataria of such a method step.

After completing this operation, the proposed algorithm according to the present invention works with the single remaining D-parameter (maxCTD), though takes into

account the normalized D-parameter (CDV) by limiting the number of links, and therefore finally produces the optimal path satisfying both of the D- parameters limitations.

For searching the shortest path, the Bellman-Ford algorithm (or an algorithm of that specific type) is the most suitable one, since it allows determining the number of links (or hops) in the shortest path. For Applicant's method, where the CDV parameter is normalized so that each link in the modified network has the uniform parameter minCDV, the number of links in such a selected shortest path will be a ready made indication of the CDV parameter of the path (minCDV X number of links = CDV of the path).

Applicant respectfully submits that Kataria does not use normalization of any QoS parameter, and does not use the Bellman-Ford algorithm for the purpose Applicant describes in the present application.

Bellman Ford is mentioned by Kataria in the Background description (col. 2, line 47), and for the metrics (parameters) advertised in the received topology information. As can be seen, Kataria neither describes nor suggests using Bellman-Ford for modified (normalized) metrics (parameters). Further, in Kataria's patent only the Dijkstra algorithm is applied and described. Kataria's algorithm is totally different than Applicant's, at least because it uses the so-

called "dynamic programming procedures" for precomputation of routing tables (col. 6, line 2) and the "Dijkstra shortest path algorithm with cell delay variation as the cost function" for Call Setup procedure (col. 7, lines 50 - 67). Neither the precomputation, nor the "Dijkstra with CDV as the cost function" can be considered equivalent to steps of Applicant's proposed method. Applicant's method does not use precomputation, the Dijkstra algorithm is incompatible with Applicant's modified network "normalized" by the CDV parameter, and the CDV is by no means a cost function in Applicant's method.

Applicant respectfully submits that Kataria's algorithm is rather slow (tables 1 and 2 of Kataria show that it is 10-100 times slower than Dijkstra). Applicant's proposed algorithm, if compared with Dijkstra, is only 3-10 times slower, and this good result, is mainly achieved by the proposed normalizing step and the further use of the Bellman-Ford-type algorithm.

The Examiner contends that Kataria builds a cost equation with weighted members. The text portions cited by the Examiner (col. 5, lines 25-47; col 7, line 48-col.8, line 15) do not relate to constructing any cost equation, nor do they relate to any weighted equation. The cited text portion

possibly comprises some similar terms and parameters, but is not related to the equation proposed in the original Claim 1.

Contrary to the Examiner's assertion, Kataria does not calculate link costs based on any equation, and does not introduce any weighted (importance) coefficients.

The Examiner asserts that Kataria "applies a shortest path algorithm to the formed data bases to determine one or more conditional (possible) paths... limited by a given number of links to satisfy the limitation of CDV..." (Citing Fig. 1A, 1B.) Figs 1A and 1B comprise algorithms, and limitations different from those used in the inventive method. Kataria's algorithms are not based on normalizing CDV (while Applicant's claimed method is.) Further, Kataria uses the additive method of accumulating values of CDV per link, but Applicant respectfully submits that the CDV values in the Kataria's method are different for different links.

The Examiner states that Kataria's algorithm "judges about the optimal path" in the similar way as the claimed method. The cited text in col. 9, line 53 - col.10, line 54 does not relate to any type of the parameters MaxCTD at all, and speaks only about the CDV or CDV(k). It confirms again, that Kataria uses only one parameter limitation in his algorithm.

The above arguments with respect to claim 1 and the Examiner's objections demonstrate the main differences between Kataria's patent (as well as other prior art references to the best of the Applicant's knowledge) and the claimed method. For at least these reasons, Applicant respectfully submits that the features outlined above a) make the amended claim 1 novel and non-obvious, and b) form the basis of a newly presented Claim 13.

Examiner's Objections To The Dependent Claims and Claims 11-12

The Examiner asserts that the features of claim 2 are supported by the text in col.9, line 25 - col.12, line 16. The text comprises nothing in common with the detailed "normalizing" features of claim 2. For example, Kataria, in the cited portion, and elsewhere, does not disclose the step of building a modified network as claimed. Nor is there any disclosure of selecting a value of minCDV or assigning to fictitious links, as claimed. (In the amended set of claims, Claim 2 is cancelled and its limitations are introduced in Claim 1.)

Objections to our claim 3 are based on Fig. 5 and claim 1 of the Kataria patent (more specifically, on the mention of administrative weights and link weights.) These weights are irrelevant to the importance weights in the cost equation. (In the amended set of claims, claim 3 is cancelled and its limitations are introduced in claim 1.)

Similar remarks can be applied to the Examiner's objections to Applicant's claims 4-10. The Examiner's objections are based just on the similarity of terms and parameters' indications in the text. This similarity is natural, since the Kataria's patent belongs to the technical field of the present invention and presents one of a plurality of alternative solutions in the filed. However, the claimed features, arranged as in the claims.

Each of the Claims 11 and 12 comprises limitations of Claim 1, just in a more detailed form. The above arguments apply to these claims *mutatis mutandis*.

For at least these reasons, Applicant respectfully submits that claims 1-13 are patentable over the prior art of record. In view of the above amendments and remarks, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejections of record. Applicant submits that the application is in condition for allowance and early notice to this effect is most earnestly solicited.

If the Examiner has any questions he is invited to contact the undersigned at 202-628-5197.

Respectfully submitted,

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